Registration no:

M .TECH
HTPE211

Second Semester Examination 2013

POWER PLANT PRACTICE AND CONTROL

Time: 3 Hours

Max marks: 70

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1	Answer the following questions:	(2 x 10)
	a) What is deaerator? Where is it exactly located?	
	b) On what factors does the nuclear reaction rate depend?	
	c) Differentiate between Load factor and Capacity factor.	
	d) What is bypass turbine?	
	e) Define the life cycle of neutrons.What is the four factor formula?	
	f) Differentiate condenser efficiency and vacuum efficiency?	
	g) What is runaway speed? How does it affect the turbine design?	
	h) What are effects of regeneration and reheat on efficiency and work output of the power plant.	
	i) What do you mean by flue gas desulphurization?	
	j) Write one relative merit and one demerit of ID fan over FD fan.	

Q2	a) Explain the terms: (i) burner (ii) converter (iii) breeder (iv) dobling	(4)
	b) What is CANDU-type reactor? Explain with a sketch its main features	(6)

Q3	a) The use of regenerative feedwater heating increases the capital cost but reduces the operating cost of a steam power plant. Explain	(6)
	b) What is TTD in condenser? How does it influence the condenser design.	(4)

Q4	How is the type of turbine selected in a certain hydro-plant? Discuss the effects of head, height of installation, the operating characteristics and the capacity on the selection process.	(10)

Q5	In a cogeneration plant, the power load is 5.6 MW and the heating load is 1.163 MW. Steam is generated at 40 bar and 500°C and is expanded isentropically through a turbine to a condenser at 0.06 bar. The heating load is supplied by extracting steam from the turbine at 2 bar, which is condensed in the process heater to a saturated liquid at 2 bar and then pumped back to the boiler. Compute (i) the steam generation capacity in the boiler. (ii) The heat input to the boiler (iii) the fuel burnig rate (iv) the heat rejected to the condenser (v) the rate of flow of cooling water in the condenser if the temperature rise of water is 6°C. Neglect pump work.	(10)

Q6   A geneearting unit of 10 MW capacity supplies the following loads: (10)
       a) domestic consumers with a maximum demand of 6 MW at a load
          factor of 20%
       b) small industrial load with a maximum demand of 3.6 MW ata
          load factor of 50%.
       c) Street-light load with a maximum demand of 400 kW at 30%
          load factor.

Find the overall cost of energy per kWh for each type of consumer
using the following data:
Capital cost of the plant=Rs. 10,000 per kW
Total running cost= Rs. 36,00,000 per year
Annual rate of interest and depreciation on capital cost=10%

Q7 a) Describe the impacts of Sox, Nox, CO and particulates on environment.   (5)
    b) Explain "small hydro" as renewable energy system. Give the   (5)
        classification with respect to capacity and head?

Q8   Write short notes on (any two)   (5+5)
    a) Electrostatic precipitator
    b) IGCC
    c) Chimney cooling tower
    d) Overview of Indian power sector